

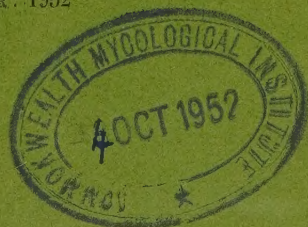


ZANZIBAR PROTECTORATE

Annual Report
OF THE
Department of Agriculture
1950

ZANZIBAR
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SECTION A. AGRICULTURE IN THE PROTECTORATE

1. GENERAL

Foodstuffs, both imported and locally produced, were in ample supply during the year in spite of a very large clove crop which not only necessitated the importation of increased quantities of food for pickers living far from their homes, but also reduced the number of cultivators as nearly all the rural menfolk turned from their fields to the more lucrative occupation of clove-picking.

Rice became much less scarce and in April the importation of 2,000 tons from Burma enabled distributional control to be temporarily removed. At the end of the year consumption was increased by the demands of clove pickers and their affluence enabled them to purchase rice instead of other foodstuffs to such an extent that large quantities of less attractive foodstuffs, such as maize meal, became an embarrassment to stock holders.

Sugar was at no time abundant. Mainland production again fell below expectations and in October the ration was temporarily reduced from four pounds to three pounds per head.

Home-produced foodstuffs were plentiful and fruit in abundance. A bumper crop of cloves and an above-average crop of coconuts have given agriculturists a false sense of prosperity and security.

2. WEATHER

The early months of the year were dry but the moderate drought was relieved by very early *masika* rains and heavy regular falls during March and April. Although wet showery conditions continued in Pemba the *masika* rains were cut short in Zanzibar after the second week of May and the middle months of the year were very dry.

By August the need for rain was felt with some severity and by October and November drought conditions were experienced in both islands. The *vuli* rains were late and fell in December though their heavy and widespread nature did much to make up for their lateness.

In both islands the year's rainfall was less than average and badly distributed, nearly three quarters falling in the months March to May. Agriculturally the weather was not unsuitable and enabled a good rice crop to be obtained and much of the clove crop to be reaped under excellent drying conditions.

The following table shows the rainfall of the past three years compared with the averages over a number of years for representative parts of the Protectorate:—

	Rainfall in inches			
	1948	1949	1950	Average
Victoria Gardens, Zanzibar ...	76.01	36.54	62.99	64.74
Kizimbani, Zanzibar ...	77.62	54.56	69.80	72.87
Chwaka, Zanzibar ...	74.30	38.14	43.78	49.64
Wete, Pemba ...	94.02	45.16	71.87	74.52
Mtambile, Pemba ...	98.75	71.53	82.94	92.95
Matangatwani, Pemba ...	99.37	53.47	73.97	76.50

3. PRINCIPAL CROPS

Cloves.—The 1949-50 harvest was not completed until March and by the end of the seasonal year, June 1950, some 20,444,927 lb. had been marketed. This represents some 584,141 frasilas or rather more than an average crop.

In July the earliest pickings of the 1950-51 crop began and harvesting was in full swing at the end of the year. The current crop gives every indication of being a bumper crop and by 31st December, 1950, some 27,721,782 lb. or 792,051 frasilas had been harvested with perhaps as much as five lakhs still to be harvested in the crop year. There is thus every indication that the record crop of thirteen and a half lakhs may be equalled again this season.

The buying prices offered for cloves and stems by the Clove Growers Association were fixed on 1st July, 1950. The price offered for cloves of fair quality in Zanzibar was Shs. 90 per 100 lb. but the Association made no purchases as the market price of cloves reached Shs. 109/50 by the end of February and rose steadily throughout the year to the unprecedented figure of Shs. 230 by the end of December with indications that the price would continue to soar.

The Association's selling prices were also fixed in July, the price for Grade II cloves being Shs. 112/50. As the Association held no stocks, the compulsory percentage of buds to be purchased by exporters from the Association was reduced to nil, and the prices were therefore purely nominal. Exports during the year kept pace with supplies and reached a peak at the end of the year when shipments of new cloves reaching Zanzibar from Pemba passed direct to the packing shed for export overseas without intermediate storage.

The 1950 export total was a large one, 39,707,022 lb. or 1,134,486 frasilas, nearly twice the average annual production. The bulk of the crop went to the Far East, the Straits Settlement taking 47.78 per cent and India 25.25 per cent. Thus the 1949 role of our two principal customers was almost exactly reversed. The United States of America purchased 8.21 per cent, Indonesia 6.70 per cent and the United Kingdom 3.49 per cent, which is less than half the quantity purchased in the previous year.

By the end of the year, when the harvest was far from complete, the quantities of stems purchased by the Clove Growers' Association for oil distillation were large in proportion to the quantities of cloves delivered to the market. Exports of clove oil were rather greater than last year and amounted to 345,555 lb.

The bumper clove crop of 1950-51 has brought considerable prosperity to the Protectorate but it is necessary to record the darker side of the picture. High export prices enabled greatly enhanced wages to be paid to pickers and the crop was very thoroughly picked. This thorough picking has resulted in branch breaking and damage to clove trees on an unprecedented scale. The damage is tragic and the full recovery of the trees will take several years, if indeed the scars of this year's harvest are ever effaced.

Coconuts.—Although falling far below the record export figures set up last year, the 1950 crop was well above average. The exports of the main products were—

		Export cwt.		Copra equivalent tons
Coconut oil	...	160,179	...	13,348
Coconut oil-cake	...	106,179	...	—
Soap	...	11,925	...	596
				13,944

The Ministry of Food's contract prices, based on £54.10.0 per ton f.o.b. for F.M.S. and £89 per ton f.o.b. (naked) for oil, obtained throughout the year. Towards the end of the year the 1951 contract prices were negotiated and satisfactory figures based on a price of £76 per ton f.o.b. for F.M.S. copra and £122 per ton f.o.b. (naked) for oil were agreed to. During 1950 the Ministry permitted the sale of 1,000 tons of copra or its equivalent of 600 tons of oil on the free markets of the world but this concession was not renewed in the 1951 agreement.

The above prices of coconut oil together with the relatively high prices obtainable for copra cake in the free European markets enabled the local oil millers to outbid copra exporters in the local copra market and in consequence all the copra produced in 1950 was expressed within the Protectorate.

Local prices for copra were fairly steady throughout the year until November when the price rose to Shs. 60 per 100 lb. in anticipation of the new Ministry of Food's contract prices. Government plantation copra was sold at an average price of Shs. 47.08, nearly Shs. 10 greater than last year.

On 1st January, 1951, the Copra Cess Decree, 1947, was replaced by a Copra Decree which makes provision for an expanded programme of activities financed from a cess on copra products exported.

A very important discovery made during the year is that the yield of coconut palms in Zanzibar is greatly reduced by a *Theraptus* bug which sucks the young fruits. Unofficial members of the Zanzibar Advisory Committee had complained for some time that when coconut plantations were invaded by Sangara ants, the yields of the palms soon fell. This view and the fact that nuts all over the island often had scars (gummosis) which were suspected to have developed from bug punctures caused when the nuts were very young, were reported as two distinct problems to the Entomologist attached to the Clove Research Scheme, and the Director kindly consented to allow him to investigate these matters. Subsequent investigations by this officer have shown that the two problems were connected, that *Theraptus* is the cause of the damage to the nuts, and that Sangara ants, which attack and kill predators of the bug, do not attack the bug itself and therefore give it a great measure of protection.

General.—An important feature of the clove and coconut industry for some years has been the high cost and the difficulty of obtaining adequate supplies of hand labour for weeding and other operations. As a climax the bumper clove crop this year enabled labourers in their unwonted affluence to decline weeding work and the lack of plantation labour has become a serious problem.

Clove and coconut planters are now turning their thoughts to mechanical methods of cultivation. A few have already purchased tractors and other equipment, and a great deal of interest is being taken in the newly purchased Ferguson tractor on the Kizimbani Experimental Station.

4. MINOR EXPORT CROPS

Exports of chillies, kapok and fresh fruit all showed considerable increases on last years' figures and these minor industries are growing in importance each year. Tobacco, on the other hand, was produced in rather smaller quantities than last year, mainly due to the movement of peasant-farmers away from their homes to pick cloves in Pemba.

A keener interest in derris root production was stimulated by the sale of a consignment of dried root reaped from small plots established by peasants in 1947. A further consignment was sold to Australia later in the year and there are indications that larger quantities of rooted cuttings will be planted by peasant-farmers during the next wet season.

Cocoa planting continues very slowly to interest the more progressive farmers. It is now certain that *criollo* cocoa is no more difficult to establish than *forastero* but that relatively deep shade and protection from wind are essential to its well being. *Helopeltis* sp. is by far the most serious pest and apparently restricts its depredation to plants growing in full sunlight or light shade. The need to establish temporary shade of banana or pigeon peas well in advance of planting out the cocoa seedlings adds to the disinclination of planters to take to cocoa planting.

Reports received from the United Kingdom on the several samples of cocoa prepared from the last crop are given on page 12. Larger samples were prepared at the end of the year, on which reports have not yet been received.

The mangrove forests are still closed pending the appointment of a Forest Officer and the re-organisation of stripping on a systematic basis to allow for adequate regeneration. There was no export of bark during the year.

5. FOOD CROP PRODUCTION

A good rice crop was harvested in both islands, which was particularly welcome after the drought-stricken crop of 1949. The yields compared with previous years are shown in the following table:—

	<i>Pemba</i>		<i>Zanzibar</i>		<i>Total</i>
1946 ...	5,000	...	3,618	...	8,618 tons paddy
1947 ...	4,585	...	5,700	...	10,285 ,,
1948 ...	6,365	...	9,780	...	16,145 ,,
1949 ...	2,500	...	4,000	...	6,500 ,,
1950 ...	6,893	...	8,750	...	15,643 ,,

Preparations for planting the 1950-51 crop at the end of the year have been slow in getting under way owing to the high wages paid for picking the large clove crop and to an ample supply of imported rice in the shops. The new crop is of some interest however, as for the first time rice cultivators were advised by the department to apply artificial fertilisers to their crops. After a publicity drive, about sixty rice growers agreed to try out the fertilisers on small portions of their land. The manures were applied by the staff of this department, from stocks specially imported for this purpose by the Clove Growers' Association.

Root crops of cassava and sweet potatoes were planted in adequate quantities in the main rains, though the exigencies of the clove crop reduced the amount planted later in the year. Good crops of sorghum were raised on the coral rag areas on the eastern seaboard of each island but the yields of pulses, as is often the case, were rather disappointing.

The following table, which shows the quantities of foodstuffs passing through the market of Zanzibar town, is a good indication of the year's food crop production compared with previous years:—

	<i>Fruit</i>		<i>Vegetables</i>		<i>Staple starchy</i>
	<i>Baskets</i>		<i>Baskets</i>		<i>foods</i>
					<i>Baskets</i>
1946 ...	65,479	...	43,581	...	72,218
1947 ...	29,140	...	43,343	...	67,795
1948 ...	50,551	...	57,872	...	58,753
1949 ...	69,943	...	49,001	...	86,297
1950 ...	43,434	...	29,140	...	67,795

Vegetables were scarce and expensive but there was an excellent crop of citrus fruits which extended far beyond the usual harvesting season.

6. ANIMAL HUSBANDRY

Importations of animals into the Protectorate from elsewhere, compared with previous years, are shown in the following table:—

	1946	1947	1948	1949	1950
Oxen ...	2,177	2,370	1,954	2,250	3,121
Cows ...	177	262	157	191	163
Calves ...	72	99	76	56	36
Goats ...	9,490	11,669	10,432	10,717	12,509
Sheep ...	1,215	1,664	1,304	1,650	1,964
Donkeys ...	46	101	44	90	103
Horses ...	3	3	1	—	—
Mules ...	—	—	—	1	—

These figures show a considerable increase over previous years and reflect an increase in the purchasing power of consumers resulting from higher prices of cloves, coconuts and other products.

Some 623 oxen, 682 goats and 76 sheep were sent to Pemba mainly during the clove harvest. In the Zanzibar abattoir the number of animals slaughtered were as follows:—

	Oxen	Cows	Calves	Goats	Sheep	Pigs
Local stock ...	179	68	64	3,022	—	257
Imported stock ...	2,549	—	—	10,309	2,100	—
Total ...	2,728	68	64	13,331	2,100	257

The Zanzibar figures show a considerable increase over 1949 whereas the figures for the number of cattle slaughtered in Pemba, given below, are smaller than for last year.

	Konde	Wete/ Piki	Ziwani	Chake/ Chonga	Mkoani	Total
Rural areas ...	175	347	119	222	220	1,083
Townships ...	—	479	—	499	129	1,107
Total ...	175	826	119	721	349	2,190

The cattle slaughtered in Pemba which were of local origin total some 1,671 as compared with 2,711 for 1949. This remarkable reduction in a year when meat in Pemba was in great demand for clove pickers was due to the affluence of the Pemba peasants who, in little need of cash during the bumper crop, asked ridiculously high figures for their animals which butchers could not pay.

There was no serious outbreak of epidemic disease during the year. There was a slight outbreak of ophthalmia in Pemba which was soon brought under control as cattle owners reported the disease in its early stages—a satisfactory indication of their confidence in the department. Redwater was diagnosed amongst cattle imported from Kenya.

As in the past two years, the diagnosis and treatment of trypanosomiasis in cattle was one of the major activities of the Veterinary staff. This disease continues to exist only in Zanzibar island and not in Pemba. Following experiments conducted by the Veterinary Officer, Antrycide methyl sulphate has replaced Dimidium bromide. Antrycide has given

somewhat disappointing results in many places, but in Zanzibar, where *T. congolense* is the chief trypanosome, no evidence of drug-fastness has been observed. This drug is far more popular among stock owners than any others used here in the past, and it is pleasing to record the willingness with which they now present their cattle for treatment.

The Veterinary Officer is of the opinion that the increase in the cattle population recorded in the livestock census about to be completed is largely due to a reduction in mortality from trypanosomiasis following the treatment of infected animals.

East Coast Fever, which exists throughout the Protectorate, continues to cause the death of large numbers of calves which are in an unfit condition due to worm infestations and other causes of debility. In Zanzibar island the large commercial dairy owners, who chiefly keep milch grade cattle in the neighbourhood of the town, regularly dip their cattle but attempts to persuade smaller cattle owners to make use of the dips erected in the more country districts have been met with organised and obstinate refusal. In Pemba three dips erected in two of the highly populated cattle districts have been quite well attended, and the response of the people has not been unsatisfactory. The total numbers of cattle dipped are as follows:—

Mpigaduri	...	...	7,594
Mtoni Dairies	...	...	35,240
Mazizini	...	...	37,757
Kombeni	...	...	480
Hanyegwa Mchana	...	...	80
Ole	...	...	9,162
Vitongoje	...	...	9,310
Konde	...	...	4,571

The hides and skins industry has undergone considerable development. The Zanzibar drying shed, now in the control of the Veterinary Section, has enabled organised shade suspension drying to be carried out and a much improved product to be marketed. Suspension-dried hides are now graded in Zanzibar and attractive prices for the superior product have greatly lowered the popularity of the old wet-salting method of preservation. In Pemba, shade-drying sheds have been erected by the department in three centres and local men trained in flaying. After initial difficulties shade-suspension drying has become popular and, provided prices remain attractive, there is every hope that this satisfactory start will be maintained. During the year the following numbers of hides and skins were suspension-dried:—

	<i>Hides</i>	<i>Skins</i>
Zanzibar, from slaughter house	1,313	15,143
Zanzibar, from rural areas	183	2,380
Pemba, Wete	230	178
Pemba, Konde	58	16
Pemba, Ole	79	18

Some 1,071 cwt. of hides and skins were exported during the year valued at £10,340, representing a considerable increase over 1949.

SECTION B. THE WORK OF THE DEPARTMENT OF AGRICULTURE

1. STAFF

The staff of the department is shown at the beginning of this report.

The Director, Mr. O. S. Swainson, went on leave prior to retirement on 9th October and the Senior Agricultural Officer, Mr. A. K. Briant, became Director-designate. Mr. G. E. Tidbury, on his return from leave on 30th September, assumed the duties of Senior Agricultural Officer. Mr. Calton, Government Chemist, was transferred to Tanganyika at the end of his leave and the post became vacant. For the whole year therefore Mr. Briant acted as Government Chemist in addition to carrying out his substantive duties.

Mr. J. C. Alley, Veterinary and Livestock Officer, went on leave on 8th August, and Mr. Fazel din Ahmed returned temporarily from his retirement to take Mr. Alley's place. Mr. I. G. C. Squire, Manager of Plantations and Mr. D. W. Winter, Agricultural Officer, spent the greater part of the year seconded to Clove Control but on 17th August, Mr. Winter was released from these duties and returned to this department until he proceeded on leave at the end of the year. Mr. A. C. E. Callan, Inspector of Produce, was on leave from 21st March until the 10th July.

Of the temporary Development staff Dr. A. L. Griffith, Forest Officer, completed his work in the Protectorate on 11th February. Owing to the difficulty of finding a suitable officer the newly created post of Forester remained vacant. Mr. J. Barrett, Farm Manager, and Mr. G. D. Wilkinson were on leave for part of the year. Mr. A. Lenard was appointed temporary Agricultural Development Officer on 14th April.

The incidence of leaves necessitated more movement of officers than is desirable particularly in filling the posts of District Agricultural Officer for Zanzibar island, Manager of Plantations and Farm Manager.

2. THE DEVELOPMENT PROGRAMME

Since its inception in 1946 the main activities of the department have been orientated around the Ten-Year Programme of Social and Economic Development. This programme as originally outlined in Sessional Paper No. 1 of 1946, was grouped under four heads: Crop Development, Crop Research, Stock Development and Education. To these have since been added Fisheries Development and the Development of Forest Resources.

The Agricultural Committees in both islands continued to meet at approximately monthly intervals, and much useful benefit and advice were derived from the discussions. One very important outcome of the meetings of the Zanzibar Committee was a request made to the Director of Clove Research to allow his Entomologist to investigate the cause of decreased yields when coconut plantations were invaded by Sangara ants. These investigations led to the discovery that the low yields are caused by a *Theraptus* bug.

*A. Crop Development**(i) Crops other than Cloves and Coconuts*

The aim underlying this section, which is by far the largest, of the Development Programme has been to broaden the scope of Zanzibar agriculture by crop diversification. The necessary trials and investigations with alternate crops have taken place at Kizimbani Experimental Station and at the several sub-experimental stations and demonstration plots established for this purpose.

All the stations and plots were fully maintained during the year and the construction of capital works was completed except for three processing units in Zanzibar island which will be completed early in 1951.

Rice.—Rice has been the main crop used in a series of fertiliser trials undertaken for the past three years. The fertiliser needs and responses of rice, which is grown in Zanzibar on a restricted range of soils, have therefore been closely studied. After reaping the 1950 experiments, it was considered that a dressing of 2 cwt. per acre of superphosphate at planting time followed by 1 cwt. per acre of sulphate of ammonia at the commencement of active growth during the pre-masika rains could be confidently recommended on all rice soils of Zanzibar island. At the end of the year, when the 1951 rice crop was about to be sown, a widespread publicity campaign was inaugurated by the department, as a result of which some sixty or more peasant rice growers purchased these fertilisers to try out on small areas of their land. The usual trial plot was one-eighth of an acre, on which area the fertilisers costing Shs. 7/50 were spread by one of the department's staff without handling charge. This is the first occasion on which artificial fertilisers have been employed by peasant-farmers in Zanzibar and may well prove to be an important milestone in the development of our subsistence agriculture.

At Kizimbani the selection of high-tillering and heavy yielding strains of three local varieties was continued and, on this station and at the Rice Demonstration plot at Kisongoni variety trials of local and imported varieties were conducted under dry and wet conditions. So far no variety has consistently proved superior to the local selection "Mngazija".

A fertiliser experiment was conducted at Kizimbani to ascertain the effects of applying various fertilisers to the seed-bed on the yield of the subsequently transplanted rice. No significant differences were observed, however, between the yields. Plots of several rice varieties were maintained on the stations for observation and demonstration and the effects of artificial fertilisers were frequently demonstrated to the public.

Vegetables.—Some thirty-one plots, each of half an acre, were leased to vegetable and rice growers on the Kibonde Mzungu Vegetable Demonstration Plot. A few tenants are keenly interested in vegetable growing and look after their plots well, taking advantage of the supply of irrigation water and of fertilisers and compost for sale on the station. The vast majority, however, are more keen on utilising their plots for rice growing from December to June, and for vegetable growing during the remainder of the year.

Four acres were maintained as demonstration plots and cultivated by the department. Suitable varieties of local and European vegetables were demonstrated as was the value of using fertilisers and compost. Rice and pulses were also grown by the department in season. Vegetables produced in these demonstrations were sold in the local market, some 4,021 lb. of mixed vegetables, forty dozen lettuce, 169 maize cobs and twenty-five cucumbers being marketed during the year.

Vegetable plots for demonstration purposes and for trying out commercial varieties were also established at Kizimbani and at Weni in Pemba.

Cassava.—Work continued with the production and testing of seedling strains from the local "Msitu" variety. At the end of the year twenty-two disease-resistant cassava hybrids were received from the East African Agricultural and Forestry Research Organisation station at Amani for multiplication and trial. The hybrids consist of crosses of *Manihot glaziovii* with cassava (second and third back-crosses), tree-cassava with cassava (second back-crosses) and *Manihot dichotoma* with cassava (third back-crosses). Some of these hybrids under the conditions near Amani are resistant to both cassava mosaic and brown streak. The early vegetative growth of these selections has been prodigious.

Fruit.—The recorded yield of orange trees in the citrus orchard was again higher than the previous year, some 98,896 oranges and 4,614 grape-fruit being harvested, representing average yields of 306 and 139 fruit per tree respectively. Could theft be ruled out records would probably show much higher figures.

In the Kizimbani nursery some 1,431 budded orange plants were distributed and budding work was undertaken to provide 2,000 orange plants next year. For the production of stocks for budding on a greatly increased scale in 1951, some 40,000 rough lemon seeds were planted at the end of the year.

A scheme for establishing a pineapple canning industry similar to that formulated before the war has been revived, and approval in principle has been given for a grant of £15,000 from Colonial Development and Welfare Funds towards the scheme.

To provide a source of planting material of Smooth Cayenne pineapples for the early expansion of the industry, the following areas were planted during the year.

Nguruweni	...	...	75,369 plants.
Kinuni Moshi	...	...	80,000 ,,
Selem	...	...	86,053 ,,
			241,422 plants.

This represents about twenty-five acres of pineapples and, in addition, several smaller trial plots have been established on a selection of different soil types. The cost of planting these pineapples was approximately 4.6 cents per plant-site.

Tobacco.—Trial plantings of imported varieties continued on the coral rag soils at Hanyegwa Mchana Experimental Sub-Station. The varieties tested this year were Nyasaland Western Heavy, Burley Stand Upright and Burley Harranova. None of these varieties has proved very satisfactory, and grasshopper damage was serious. The Nyasaland Western Heavy, as last year, appeared to be the most promising type.

As regards the commercial prospects of these imported varieties they appear to command no more ready market than the common native local type, and they offer little hope of gaining more satisfactory financial returns. The Clove Growers Association acted as the buying agent of the Italian Tobacco Monopoly in Somaliland for the purchase of native tobacco, but owing to the price offered only about four tons were actually purchased.

Cocoa.—Some of the problems concerning the establishment of cocoa in the field are becoming clearer as a result of the year's work. Trial plots in which criollo, forastero, and Bule porcelaino varieties were planted together have indicated that forastero, contrary to expectations, is less easy to establish than criollo although, when established, it makes more vigorous growth. By far the major difficulty in establishing young cocoa is due to attack by a species of *Helopeltis* which sucks the young stems. Where a stem is attacked black blotches appear, the leaves of the stem die, and the whole stem then dies back. As fresh growths proliferate from the stem below, these often become attacked and the plant then becomes very stunted. It is now clear that *Helopeltis* damage is worst in the areas unprotected from wind, where plants are in full or almost full sunlight, and least where they are growing under moderate to heavy shade. In all Government and most private cocoa plantations this year shade trees, such as *Peltophorum ferugineum*, *Cassia siamea* and *Gliricidia* as well as ground shade of coco-yam, banana, and pigeon peas have been planted at close intervals, but it is too early yet to see results. The Kizimbani five-acre block, where the poor growth for several years has been met with a programme of spraying, dusting, hand collection of insects, fertiliser dressings, mulching and applications of trace elements—all with little or no effect—was recently planted with tropical kudzu. This plant has scrambled up the gliricidia and cassava and commenced to cause shady, humid and still conditions. The cocoa plants now show much more healthy growth which it is hoped will be maintained until permanent shade trees afford the necessary protection.

Some 10,250 criollo seedlings were issued to the public but it is not yet possible to record much real interest in cocoa growing except in the case of a very few keen Arab farmers.

The nine-acre shade-tree trial was planted this year but owing to the very low survival rate and poor growth of the cocoa, due largely to insufficient protection, it will be replanted with cocoa in 1951.

The Dunga plot of mature criollo trees yielded a good harvest of 1,709 pods, averaging thirty-one pods per tree. This plot still provides the bulk of our planting material although this year a useful contribution was derived from the young areas.

Work on the vegetative production of cocoa plants was in abeyance for part of the year owing to staff difficulties but, later, a new solar propagator was built and work recommenced, particular attention being paid to the rooting of cocoa leaves.

Of particular interest this year is the report received on five small samples of cocoa prepared from both criollo and forastero beans. Details of the samples in the order in which they were fermented and the reports made by the British Food Manufacturing Industries Research Association are as follows:—

- (1) Thirty pounds criollo, fermented six days, maximum temperature 104°F. "a little raw and unfermented".
- (2) Forty-four pounds criollo, fermented six days, maximum temperature 105°F. "not quite so harsh but still underfermented".
- (3) Nineteen pounds criollo, fermented six days, maximum temperature 107° F. "criollo flavour developing but some off flavour".
- (4) Twenty-six pounds criollo, fermented six days, maximum temperature 105°F. "Best of these criollo samples. Yields a sweet mild chocolate".

The fifth sample was of forastero cocoa. The reports on the criollo samples indicated that the quality improved progressively with each successive fermentation, probably owing to the fermenting box becoming more and more inoculated with better types of fermentation organisms. As is usual when fermenting small samples, the temperatures attained were too low, but there is every indication that with more effective fermentation a very good product would be obtained. At the end of 1950 a larger quantity of criollo cocoa was prepared. This fermented better and a maximum temperature of 120°F. was obtained. The prepared cocoa has been sent to the United Kingdom for a report.

Sorghum.—A fertiliser experiment on sorghum was again laid down this year on a *terra rosa* soil at Makunduchi. The crop grew well and produced an average yield of 651 lb. per acre. The experiment demonstrated very well the response of sorghum on these soils to applications of potash.

Coffee.—In the demonstration blocks at Kizimbani the yields of Liberian and Excelsa coffee were lower than last year. The trees suffered in the dry months at the beginning of the year and this undoubtedly reduced their yield. Yields in lb. were as follows:—

Variety	No. of trees	Year planted	1942	1943	1944	1945	1946	1947	1948	1949	1950
Excelsa	... 175	1939	116	380	278	952	889	972	3,211	772	770
Liberica	... 256	1928	568	962	320	868	2,130	355	2,775	2,112	1,172

Demonstration plots of Liberica coffee have been maintained on all other suitable stations in both islands and planting material has been made available to the public at the nurseries.

Oil-palms.—The deterioration in the health and productivity of the Deli-type oil-palms at Kizimbani has continued and increased. The new block planted in 1942 came into bearing this year but in spite of the increase in the number of bearing palms the total yield of oil was about half of last year. Many of the palms planted in 1936 appear to be suffering from a root disease not yet identified, and several have died.

Seed imported from Nigeria last year of Dura crossed with Dura, Tenera, and Pisifera types is slowly germinating in the nurseries and is not yet ready for establishment in the field.

As a development crop, oil-palms must be considered as most unlikely to succeed.

Cashew Nuts.—This crop has not proved as successful as was originally hoped. Demonstration plots of an improved Goan variety were maintained in several places in Pemba where it grows well. On the eastern demonstration plots in Zanzibar, growth has been poor.

Papaws and Papain.—There have been no further developments with papaws and this crop is not now considered likely to fulfil its early promise.

Derris.—Derris has been established on Experimental Stations and Demonstration Plots in all suitable areas and publicity given to the crop. Nurseries for the free distribution of rooted cuttings to the public were constructed and 15,000 cuttings issued. So far there has been little interest in Pemba but interest is increasing steadily in Zanzibar island and owing to the recent increase in prices obtained for peasant crops a much greater demand for planting material is expected for the next planting season.

Bird's Eye Chillies.—Demonstration plots and nurseries for the distribution of free seedlings to the public have been maintained in all suitable areas. Public interest and demand for seedlings greatly increased in Zanzibar island and some 335,000 free seedlings were issued. In Pemba little public interest has yet been aroused and few of the seedlings available were taken up.

Other crops not included in the original development programme which have received considerable attention on the experiment stations are as follows:—

Sunflowers.—Four varieties of sunflowers received from the Overseas Food Corporation were planted for trial at Kizimbani and Hanyegwa Mchana. None gave any promise of being likely to suit Zanzibar conditions although varieties *Hungarian* and *Jupiter* did much better than *Pole Star* and *Mars*.

At Hanyegwa Mchana a plot of sunflowers of a local white variety dressed with ten tons of farmyard manure per acre produced a yield of 690 lb. per acre of clean seed.

Sunflowers were planted in several of the fertiliser trials this year. On the Kinongo soil at Hanyegwa Mchana an average crop of 276.5 lb. per acre showed a significant response to potash. At Makunduchi white sunflowers yielded 436 lb. per acre after a dressing of eight tons of compost compared with only 196 lb. per acre with no manure. The Kinongo soil here has also been shown to respond to potash.

On the Changa soil at Kisongoni an average crop of 383 lb. per acre was obtained which showed a significant response to phosphate as is usual on this type of soil.

Simsim.—A trial crop of white simsim var. *Kuman* failed at Hanyegwa Mchana. Simsim growing is becoming increasingly important on the coral rag areas and two other varieties have been imported from the East African mainland, for trial.

Kapok.—A block of kapok trees, from a local selection, was planted at Kizimbani and an earlier planted area of the same selection is making good growth. Four other blocks of kapok, planted from seeds imported from the Far East, again yielded very disappointing crops.

In Zanzibar a genuine interest is now being taken in kapok planting. The tree grows well on the coral *uwanda* and there is a steady demand for both lint and seed in overseas markets. The department has given advice to merchants intending to erect mechanical means of separating the lint from the seed, and two or three of these plants are now in operation. These merchants also make use of the department's baling press.

Groundnuts.—Three new varieties received from the Overseas Food Corporation—*Spanish Bunch*, *Natal* and *Common Valencia*—were tried out at Kizimbani and Hanyegwa Mchana in *masika* and *vuli* sowings but gave very disappointing results.

Jute substitutes.—A sample of Roselle fibre grown and prepared at Kizimbani was sent to the Colonial Products Advisory Bureau for a report on its quality and value. The report was disappointing, stating that "in view of the short length and unsatisfactory quality of the fibre, it is not felt that commercial production would be worth while, at any rate for export purposes". Work with Roselle has therefore been discontinued.

A sample of *Urena lobata* fibre from Kizimbani was also sent for examination to the same authority but a report has not yet been received.

Plots of Ramie and of Mauritius hemp are also being maintained at Kizimbani for trial.

Cotton.—A time-of-planting trial of variety BP 52 failed owing to the poor viability of the seed. Further supplies of seed of this and several other varieties have recently been received from the Empire Cotton Growing Corporation in Uganda for trial on our rocky coral soils.

(ii) Clove Regeneration

The following are the details of the distribution of clove seedlings this year:—

		<i>Zanzibar</i>		<i>Pemba</i>		<i>Total</i>
Sold	...	42,040	...	37,113	...	79,153
Issued free	...	77,260	...	29,190	...	106,450
Total	...	119,300		66,303		185,603

The total distribution was greater than in either of the two previous years but is still low; this is due mainly to the present boom in coconut products and to the general uncertainty as to the future of cloves. The present bumper crop of cloves will, however, undoubtedly stimulate interest in clove-planting next year.

The cost of producing clove seedlings for sale was borne by Protectorate votes and that of seedlings for free distribution by Clove Growers Association and Colonial Development and Welfare funds.

(iii) Copra Production

The services provided under this heading, although they were commenced as a "Development" project, have now been extended and are financed from monies provided by the Copra Cess Fund.

Nurseries for the production of coconut seedlings for sale to the public at prices far below the cost of production were maintained in both islands. By far the greater provision, however, was made for Zanzibar where the present position of the sudden death disease of cloves and the existing soil types make the coconut industry relatively much more important *vis-à-vis* cloves than in Pemba. Altogether some 146,722 coconut seedlings were distributed and provision was made for a large number to be ready for planting in 1951.

In both islands the free services of inspectors and masons were provided to persons who wished to build or repair improved types of copra-kilns and who were prepared to purchase the materials. In Pemba thirty-two new kilns were built and eleven old ones repaired. In Zanzibar fifty-six new kilns were built and fourteen old ones repaired.

Although this kiln-building service has been continued for several years and has provided a very large number of excellent kilns capable of producing first-rate copra, the product as brought to market still leaves much to be desired. Even the best kilns cannot make good copra if the operator removes it before it is dry in order to get as large a weight as possible compatible with just being able to sell the produce as copra. Instruction in copra-making is undertaken by inspectors stationed in both islands who visit the kilns where bad copra failing to pass the Produce Examiners is produced. It is up-hill, unrewarding work and little permanent progress can be reported in spite of unremitting efforts.

(iv) Afforestation Survey, Anti-Erosion and Utilisation of Semi-Wanda Areas

Since the framing of the original Development Programme a further grant was made for the Development of Forest Resources.

The absence of a Forest Officer during the year has held up work planned for soil-erosion control in the Masingini area and no specific soil-conservation activities have been undertaken. In Pemba, however, soil-conservation activities are embodied in the work of the demonstration plots and are continually being demonstrated to the public.

Investigations into the Utilisation of Semi-Wanda areas have been continued at the Hanyegwa Mchana Experimental Sub-Station. Arable crops are under trial on this station but with most crops yields are small

and the work of tillage in the coral soils is difficult and expensive. However, hopes are entertained that in at least two directions the *uwanda* areas can be profitably utilised. These are by afforestation and by cattle grazing.

Trial plots of forest tree species were established two and three years ago and it is now becoming possible to see which species are proving suitable. Best results are being obtained so far with—

Casuarina equisetifolia.

Terminalia catappa.

Calophyllum inophyllum.

Eucalyptus sp.

Cassia siamea.

Acacia auriculiformis.

Less successful but still remarkably good growth has been achieved with—

Tectona grandis.

Ceiba pentandra.

Bridelia micrantha.

Chlorophora excelsa.

Acacia decurrens.

Pithecolobium saman.

Pterocarpus indicus.

The following show little hope of being suitable for wanda conditions:—

Sapium sebiferum.

Sapindus saponaria.

Eugenia jambolana.

Vitex cuneata.

Mangifera indica.

Sterculia alata.

Prosopis juliflora.

Pterocarpus dalbergeoides.

Sorindeia madagascariensis.

In these trial plots the tree seedlings were planted in holes prepared in the coral rock which had been filled with soil. Later plantings are being undertaken by the less expensive method of planting seed at stake. Tree-planting is also being undertaken under more arduous conditions at Muongoni Demonstration plot.

The open stretches of *uwanda* country are likely to provide useful grazing if properly managed. The sward consists chiefly of *Heteropogon contortus* which provides excellent grazing when it flushes after the main rains. After it flowers, however, it produces needle-like awned seeds and a tough wiry mass of dry herbage which normally catches fire and burns off in the next drought period. These grass areas are not utilised for grazing, as, although they provide excellent fodder at times when this is plentiful everywhere, they in their present state do not provide good keep when grass is scarce elsewhere. Moreover cattle were thought to be unable to live under *uwanda* conditions all the year round in a healthy condition.

At Hanyegwa Mchana a walled paddock was provided for a controlled grazing experiment in which the *Heteropogon* sward was heavily grazed during the flush and not allowed to flower. Subsequently, grazing was controlled by allowing cattle to graze only when sufficient grass was available for them to satisfy themselves easily but never allowing the grass to become tall and rank. By this means some 253 cattle days per acre were obtained from this paddock and the cattle made a sixty-five pound per head live weight increase during intermittent periods amounting to fifty-four days. Between these periods, while grazing in the open *uwanda* outside, the cattle made only a 0.8 lb. per head live weight increase over 140 days.

The *Heteropogon* sward improved enormously under controlled grazing. Weeds were kept down and the proportion of other grasses which are usually crowded out by *Heteropogon* or destroyed by fire increased quite noticeably. It is evident that cattle can thrive under *uwanda* conditions provided the grazing is controlled. Experimental work on the use of *uwanda* grazing is being continued and expanded.

B. Crop Research

Clove Research.—All the work done under this head has been undertaken by the Clove Research Scheme. During the year considerable progress has been made with mycological investigations. It has been found that the chief cause of die-back in the clove is a fungus, which is a new species of either *Cryptosporella* or *Diaporthopsis*. Its pathogenicity has been fully established and confirmed by field experiments. Attack is invariably through wounds, and these are usually those caused by harvesting. Sometimes, where young trees are damaged in the main stem, fungal attack results in girdling. In such cases death is indistinguishable from "sudden death" and it is now thought that most, if not all, cases of "sudden death" in young trees are caused in this manner. Research on methods of control has now started.

A second fungus, a new and undescribed species of *Valsa*, has been found to be invariably associated with sudden death of mature trees. Its pathogenicity has been established. It would, however, be premature to say more than this until more experimental work has been done.

Entomological studies of the relation between various ants have been undertaken especially in connection with the incidence of a *Theraptus* bug which has been found to be the cause of the Gumming Disease of coconuts.

C. Stock Development

(i) Survey of Cattle Diseases and Disease Control

Apart from worm infestations, the two most common important diseases in the Protectorate are trypanosomiasis and East Coast fever. Trypanosomiasis occurs in Zanzibar where it is transmitted by the tsetse *Glossina austeni*, but neither the disease nor the tsetse occur in Pemba. East Coast fever exists in both islands.

Mr. D. L. Johns, a Research Officer posted to Zanzibar by the East African Tsetse and Trypanosomiasis Research and Reclamation Organisation, continued his investigations into the incidence, life history and movements of the tsetse fly *Glossina austeni*, particularly in relation to vegetation and climate. His researches were completed at the end of the year but his report will not be available until the large mass of data collected has been analysed.

It is now clear that the incidence of tsetse is greatest in the east and south of Zanzibar island, especially in those parts which are characterised by heavy bush growing on out-cropping coral. In this bush exists a large population of wild pig and antelope which are hosts to the fly. There are not many cattle in these areas. In contrast, the western part of the island supports plantations of cloves, coconuts and other crops and a much denser population of cattle. Here the incidence of tsetse is lower and its breeding is apparently confined to an unknown number of separate, relatively small foci.

These foci consist of patches of heavy vegetation, containing dense trees such as mango and ground vegetation such as bananas, neglected weeds and shrubby undergrowth. Overgrown burial places are commonly inhabited. The fly may be widespread in wet, cloudy weather especially where plantations are weedy and neglected. The work shows that *Glossina austeni* is more widely distributed in Zanzibar than had been originally thought.

While further survey work is needed, it is now considered that the eradication of tsetse is not feasible in the eastern coral bush areas but might be possible in the clove and coconut areas of the west. The land in these areas is privately owned and legislation would be a necessary prelude to clearance activities.

The staff of the Veterinary section of the department continued to pay regular weekly visits to rural areas in Zanzibar island to examine sick animals. All cattle found to be infected with trypanosomiasis (chiefly *T. congolense*) were treated with Antrycide methyl sulphate. Under Zanzibar conditions no evidence of drug-fastness has been observed and the treatment is proving to be popular among the cattle owners. In the rural areas, of 2,238 animals examined, 479 were found to be infected with trypanosomiasis and treated. In addition seventy-five infected animals were treated near the town, making a total of 554. It is believed that all these animals, had they not been treated, would have died from the disease. The number of animals treated in 1948 and 1949 were 461 and 478 respectively, the increase in 1950 being due partly to an increase in the Zanzibar cattle population and partly to the increased willingness on the part of cattle owners to submit sick animals for examination.

With regard to East Coast fever, the Veterinary Officer is of the opinion that the importance of this disease has been exaggerated in the past, and that young animals, if otherwise healthy, usually recover from an attack. The disease, however, does cause the death of a large number of animals which have become debilitated by worms and other causes.

In Zanzibar the dips at Mtoni and Mazizini were well attended by the large herds of dairy cattle kept in the vicinity of the town. Only very few cattle belonging to small cattle owners attended the dips at Mazizini, Kizimbani, Kombeni and Hanyegwa Mchana. The dips at Mwera, Kibonde Mzungu and Bweleo have never been used.

The unwillingness of a few of the small cattle owners to dip their cattle at Kombeni through ignorance and obstinacy has since developed by organised propaganda and pressure into a general boycott of the rural dips by nearly all the small owners. In Pemba, on the other hand, the situation is brighter. The dips at Ole and Vitongoji have been relatively well attended in spite of a certain inertia due to laziness. The local people are satisfied that dipping is beneficial and are generally prepared to co-operate. During 1950 a third dip was opened at Konde in northern Pemba and arrangements have been commenced to build a fourth at Kiuyu.

(ii) Development of Cattle Industry

This project during 1950 was in its ninth year. At the end of the year the Kizimbani herd, excluding bullocks, numbered 206 animals of which sixty-six were milking cows. The only important change in management made this year was to substitute skimmed milk for whole milk in calf rearing. This change caused a noticeable improvement in the health of the calves and also enabled ghee to be made on the farm and sold to the public.

The milking byre was enlarged and improved and now provides standings for forty cows. The stock farm buildings and dairy are far superior to any commercial dairy in the Protectorate and provide a very satisfactory standard for clean milk production.

The health of the herd has been satisfactory although there was an increase in the occurrence of trypanosomiasis and a sharp outbreak of nephritis which caused the death of five calves before it was brought under control.

The breeding policy of the station was maintained and bull testing continued, each bull being allowed to cover fifty cows. The imported bull from the Rumuruti herd in Kenya has improved very markedly in appearance. His progeny are larger at birth than the calves of other bulls and have made better live-weight gains. They are moreover all polled. A large number of heifers born since the commencement of this bull testing policy are approaching their first lactations. It will be some time before it is possible to make any comparisons between daughters and dams to determine the effect of the sires. From the herd records, it appears that improvements in performance due to management and selection reached a ceiling in 1948 since when the herd's performance has been steady at this ceiling. Further improvement must almost certainly depend on genetic changes.

Milk production figures for the year indicate an average milk yield in 305 days of 1,805 lb. and a daily average of seven pounds per cow in milk for the whole herd. These figures are not unsatisfactory when it is realised that all young cows including poor milkers are kept in the herd to complete the two full lactations in order that valid comparisons may be made with their dam's performances.

(iii) Pasture Improvement

Investigations into the management of pastures continued at Kizimbani and elsewhere. Of the grasses tried at Kizimbani *Stenotaphrum dimidiatum* (Pemba grass) forms the most dense permanent sward and is the most effective smotherer of weeds. If kept short it is capable of supporting large numbers of stock. Almost as useful on good soils, and considerably better in drier areas, is a local species of *Digitaria*. Of the imported grasses, *Paspalum notatum*, still under trial, may prove useful on light soils, and both Rhodes grass (*Chloris gayana*) and Molasses grass (*Melinis minutiflora*), are doing well in Pemba especially. No grass is yet known which can be established satisfactorily on a large scale by locally produced seed. Establishment by cuttings is slow and expensive and must prove a considerable handicap to any system of alternative husbandry.

Weed control is a continual problem and experiments with herbicides and various weed killers are in progress. None of the herbicides yet tried has effectively killed *Oldenlandia bojeri*, *Stachytarpheta* spp. and other tough perennial weeds.

A manuring experiment on pasture was established in the Mtoni Dairies grazing area and early results indicate a marked response to phosphate and compost in terms of total herbage and legume content. Composting on a larger scale has markedly improved light sandy pastures at Matangatwani in Pemba and at the Zanzibar Quarantine Station.

Of the cut fodders, tropical kudzu (*Pueraria phaseoloides*) continues to be of signal value although this useful crop becomes thin, weedy and non-productive after a ley of about six years.

D. Education.

Agricultural Training Course.—The “Young Farmers Course” was continued although this year no primary school teachers took the course and their absence was detrimental. Nine sons of landowners commenced the course but four of them who showed very little interest in agriculture later resigned.

So far, it appears that the majority of landowners’ sons who have taken the course have regarded it as a means of obtaining temporary employment and have had little intention of taking up farming as their final occupation.

The Kizimbani school provided a limited amount of theoretical and practical tuition in elementary agriculture to boys from the Khalifa Rural Middle School.

Six students attended a more advanced two-year course to train them as Agricultural Assistants in the Department. These students were recruited from Standard XII in the Secondary School and will probably be absorbed into the Senior Time Scale.

E. Fisheries Development in Zanzibar and Pemba.

Although the Fisheries Officer was appointed in the latter part of 1949 the Fisheries Development Scheme was not finally approved until 1st March, 1950. A European Shipwright was appointed early in the year and a locally recruited subordinate staff was engaged. A fisheries office and net store were built in the harbour area and a house was erected outside the town for a Senior Fisheries Guard.

The Shipwright has been engaged in building a 65-foot fishing vessel and although this work has entailed training local craftsmen in boat-building very satisfactory progress has been made. A small powered fishing dory was purchased for preliminary survey work and in-shore investigations pending the completion of the larger vessel.

The reef areas particularly to the south and east of Zanzibar were surveyed from June to November, with the object of locating and assessing the potential catching rate of crawfish or spiny lobsters. Of the several methods of capture investigated skin diving was found to be the most encouraging, a two-man team being able to catch eighteen crawfish in a four-hour day. Very few of the local fishermen however were inclined to adopt this form of livelihood.

Fish farms have been constructed at Chukwani for salt water and at Kibonde Mzungu for fresh water species. The nine acres of ponds at Chukwani were stocked with mullet and milkfish which entered freely at spring tides. After a six months' observation period it became clear that predatory barracuda and rock cod fry which had entered with the other fish were devouring large numbers of the farmed fish. It is considered that future stocking will have to be done by hand from fish traps situated outside the ponds in order to avoid the entry of predatory species. Stocking at 1,000 per acre is aimed at and for successful results the water will have to be refreshed and topped up at each spring tide, without allowing predatory fry to enter.

Two fresh water ponds, each two-thirds of an acre, were used to study the growth rate and farming possibilities of *Tilapia nilotica*, introduced from Korogwe by the kindness of the Tanganyika Government, and *T. mossambica*, a local species. These ponds have not yet been harvested.

Nine recording posts were established in Zanzibar Island to ascertain the quantities of fish landed daily by local fishermen.

F. Development of Forest Resources.

The temporary Forest Officer completed his work in the Protectorate in February. The main forestry activities which continued throughout the year have been the Prison fuel schemes and re-afforestation at Walezo-Chumbuni and Kichwele-Pangeni.

The forest nurseries at the Migombani Botanical Gardens were enlarged to provide planting material for the Walezo-Chumbuni plantation where prison labour planted 27,252 seedlings of fuel and timber species during the year. The seedlings planted were chiefly of *Casuarina* and *Eucalyptus*, with smaller numbers, mainly for trial, of *Sorindea*, Jackfruit, *Vitex*,

Wattle, *Chlorophora* and *Acacia*. The soil at Walezo-Chumbuni is particularly poor and eroded and there were large numbers of casualties. Subsequent growth of the survivors was poor in spite of regular attention.

At Kichwele-Pangeni a prison camp was established and a small forest nursery planted. Although field planting will be commenced in 1951 the main task during the early months is that of building quarters for warders and prisoners.

3. FERTILISER TRIALS.

In 1949 the results of the series of fertilizer experiments, which are being conducted in conjunction with those under the auspices of the East African Agricultural and Forestry Research Organisation Fertiliser Scheme, were obtained in a year of serious drought. It was considered desirable therefore to repeat much the same programme in 1950 to confirm the results. The results have been well confirmed and, as far as rice growing in Zanzibar Island is concerned, have enabled positive recommendations to be made to peasant cultivators, to whom artificials have been offered for sale.

(i) *Rice Experiments.*

In these experiments nitrogen was applied in the form of sulphate of ammonia at three levels: 107, 214 and 321 lb. per acre, and phosphate as superphosphate at 2.1, 4.2 and 6.3 cwt. per acre. In Pemba the superphosphate was applied at 124, 248 and 372 lb. per acre. The experiments were factorially designed in order that a study of the interactions between the fertilisers at various levels could be made.

(a) *Mahonda (Changa soil).*—A fair crop of 1,792 lb. per acre average yield was reaped and significant responses were obtained to phosphate manuring and to one form of the interaction between nitrogen and phosphate. The highest dressing of phosphate caused a yield increase equivalent to 1,215 lb. per acre, worth, after deducting the price of the fertiliser, Shs. 338.00 per acre.

(b) *Kisongoni (Changa soil).*—This crop was a fairly good one averaging 1,669 lb. per acre but the responses to fertilisers were disappointing and were not statistically significant. Nitrogenous manuring was profitable, however, for the lower levels, and the highest individual yield was obtained by the combination N_2P_1 .

(c) *Cheju (Namo soil).*—There is no doubt that the best responses to nitrogen are obtained in the heavier soils such as exist in this area. Both nitrogen and phosphate responses were statistically significant, the heaviest nitrogen dressing causing an average response of 655 lb. per acre in a 1,383 lb. average crop, equivalent to a profit of Shs. 154.00 per acre.

(d) *Msuka, Pemba (Mtifutifu soil).*—On this light soil the significant responses were all to phosphate the average yields of paddy per acre being most striking:—

Average P_0	=	308 lb.
Average P_1	=	1,509 lb.
Average P_2	=	1,726 lb.
Average P_3	=	1,851 lb.

The presence of nitrogen is necessary, however, for the best use to be made of the phosphate and the combination N_1P_1 caused a yield increase of 1,688 lb. per acre equivalent to a profit of Shs. 591.00 per acre.

(e) *Mtambile, Pemba (Kinyefu soil)*.—A poor crop was obtained averaging only 624 lb. per acre of paddy. On such a poor overall crop profitable responses to fertilisers are difficult to obtain although in this experiment the phosphate response was statistically significant as were three of the interactions between the two fertilisers.

(f) *Ole, Pemba (Kinako soil)*.—The very heavy soil at Ole produced a good crop, averaging 1,664 lb. per acre of paddy, and there were clear and profitable responses to phosphate. A most curious aspect of this experiment, however, was a significant negative response to nitrogen, a response which will have to be investigated further.

These rice experiment results have confirmed the previously held view that nitrogen and phosphate may be profitably applied in all rice growing soils and that a suitable general level of application is 1 cwt. of sulphate of ammonia plus 2 cwt. of superphosphate per acre. Phosphates are of great value on light soils where the effect of root stimulation assists the crop to overcome periods of drought. Apart from the anomalous result at Ole the value of nitrogen is best observed in heavy water-retaining soils, e.g. *namo* soils, and in the positive interactions in which nitrogen enters in combination with phosphate.

(g) *Kizimbani*.—At Kizimbani, where rice is transplanted to the field from rice nurseries, an experiment was undertaken to ascertain whether it would be profitable to apply fertilisers to the nursery beds at seeding time rather than to the field. The results indicated that compost was of value, in terms of the final crop of rice, especially when the rice seed was early planted. The major plant nutrients applied to the nursery apparently had no significant effect on the ultimate crop.

(ii) *Maize Experiments.*

(a) *Selem (Changa soil)*.—As is now expected on Changa soil the response to phosphate was striking. The following figures represent average yields at all levels of nitrogen, an important fact, as the nitrogen-phosphate interaction was significant in this experiment.

<i>Superphosphate per acre</i>		<i>Yield per acre.</i>
Nil	=	162 lb.
124 lb.	=	256 lb.
248 lb.	=	336 lb.
372 lb.	=	369 lb.

These yields are low and a direct response to nitrogen was not observed although it might have been had the overall yield been higher.

(b) *Mkwajuni (Kinongo soil)*.—On Kinongo soils phosphates are apparently not deficient but potash is of importance. This experiment brought out the response to nitrogen very well, the following yields being averages at all levels of potash.

<i>Sulphate of Ammonia per acre</i>		<i>Yield per acre.</i>
Nil	=	328 lb.
107 lb.	=	594 lb.
214 lb.	=	765 lb.
321 lb.	=	1,110 lb.

This response was statistically highly significant.

(c) *Kizimbani (Changa soil)*.—A maize experiment with compost was undertaken to ascertain whether the response to compost dressings achieved in earlier experiments was due to the heavy content of pen manure which is always present in Kizimbani compost.

In this trial a special supply of compost was made without pen manure and used in a comparison with ordinary rich Kizimbani compost. The results were as follows:—

1. No compost.	=	30.4 lb. per acre.
2. 10 tons compost per acre (without pen manure).	=	172.8 lb. per acre.
3. 15 tons compost per acre (without pen manure).	=	244.8 lb. per acre.
4. 10 tons compost per acre (containing pen manure).	=	219.2 lb. per acre.
5. 15 tons compost per acre (containing pen manure).	=	348.8 lb. per acre.

Statistically both the 15 ton dressings were superior to the other treatment ($5 > 2$ and $1 : 4$ and $3 > 1$). The yields were very low but it is of interest to observe that the presence or absence of pen manure caused no significant differences at the same level of application although the richer compost was clearly superior and therefore at least a part of the value of Kizimbani compost must be attributed to its content of pen manure.

(d) At Kizimbani, also, an experiment was laid down to investigate the value of superphosphate applied to the crop in the form of pellets and "placed" compared with the normal method of broadcasting the powdered fertiliser. Unfortunately a severe attack of maize borers caused the experiment to be abandoned.

(iii) *Sorghum Experiments.*

Makunduchi (Kinongo soil).—As is usual on kinongo soil there was a significant response to potash in the presence of nitrogen although no significant response was observed to the nitrogenous dressings. The potash yields were as follows:—

<i>Muriate of Potash per acre.</i>		<i>Yield per acre..</i>
Nil	=	406 lb.
54 lb.	=	741 lb.
108 lb.	=	752 lb.
168 lb.	=	702 lb.

(iv) *Sunflower Experiments.*

(a) *Kisongoni (Changa soil).*—Yields were low but the response of the crop to phosphate was significant statistically as was one of the nitrogen-phosphate interactions. Nitrogen alone was disappointing, as yields diminished as the dressings of sulphate of ammonia increased. The increased leafy growth due to nitrogen possibly made too heavy demands on soil moisture.

(b) *Hanyegwa Mchana (Wanda soil).*—Although nitrogen and phosphate apparently caused slight increases in the yield of sunflower seeds they were not statistically significant. Applications of muriate of potash however markedly increased yields.

(v) *Microplot Survey in Pemba.*

A reconnaissance survey of soil-nutrient status was undertaken in Pemba in 1950 using the microplot technique. As in Zanzibar in 1949, maize was used as the indicator plant and the treatments represented all combinations of N(3 cwt. sulphate of ammonia per acre), P(2 cwt. soda-phosphate per acre), K(1 cwt. sulphate of potash per acre), Lime(1 ton per acre) and compost(5 tons per acre).

The results indicated much more uniform conditions than are found in Zanzibar owing to the absence in Pemba of coral-derived soils corresponding to the *wanda* and *kinongo* soils of Zanzibar. *Maweni* soil is present but was not tested as its rocky nature does not lend itself to experiments of this type. On the other soils nitrogen was everywhere of value though significant yield increases in all plots were observed only on *semi-utasi*, *mtifutifu*, *kinako*, and *kinyefu* soils. Elsewhere yields were increased but sometimes not significantly so.

Phosphate was beneficial everywhere, but statistical significance was rarely achieved. The interaction between nitrogen and phosphate was of much the same order.

Potash, as was expected from the lack of coral-derived soils, was rarely of value although small increases were observed on *semi-utasi* soil and on two rather anomalous *bopwe* soils.

Compost caused increases in *utasi*, *bopwe*, *mtifutifu*, *kinako* and *kinefu* soils but significance was not the rule, as was also the case with the nitrogen and compost interaction.

Lime responses, as in Zanzibar, were cryptic and irregular. Lime caused yield increases in *ndamba* soil which is of theoretical interest only as this soil has no agricultural value, but usually decreased yields on other soils. The lime-nitrogen interaction also sometimes had a depressing effect. This irregular, but frequently depressing, effect of lime is probably connected with induced deficiencies of trace elements.

4. DISTRIBUTION OF PLANTING MATERIAL.

An important feature of the work of all the experiment stations and demonstration plots is the production and distribution to the public and to Government Departments of planting material. This takes the form

of fruit and other economic plants which are usually sold at prices well below cost of production and also seeds and cuttings of food plants which are normally distributed free. The quantities of all forms of planting material distributed in 1950 are shown in the appendix.

5. GOVERNMENT PLANTATIONS.

Although in recent years the Plantations section of the Department cannot be regarded as a discrete economic unit, owing to the overlapping of staff duties, and the continuance of certain valuable activities, such as compost manufacture, which are not paying their way, the summarised statements of the year's activities are of considerable interest. The section showed a net profit of Shs. 257,103.77, more than twice as great as that of 1949 and exceeding the record year of 1948.

The profit was mainly due to the high prices being paid for cloves and coconut products. The following table shows the clove harvest figures compared with those of previous years:—

Season		Green cloves	Dry cloves	Dry stems	Average price
		lb.	lb.	lb.	Dry cloves Shs.
1945-46	...	3,747	1,185	342	51.25
1946-47	...	273,692	87,032	24,368	52.28
1947-48	...	11,202	3,691	1,048	47.04
1948-49	...	48,792	15,951	4,828	68.24
1949-50	...	281,491	95,601	24,467	83.39
1950 (six months)	...	180,944	59,572	15,923	145.40

The 1950-51 clove season was not yet completed and prices continued to rise after the end of the year.

Comparative figures for the coconut harvest including small amounts carried forward from the previous year are:—

1946	...	2,714,272 units.
1947	...	2,261,366 ,,
1948	...	2,143,733 ,,
1949	...	3,081,695 ,,
1950	...	2,815,289 ,,

Figures of copra making are shown in the following table:—

	1950	1949	1948	1947	1946
(1) Copra made - tons	340.78	385.26	264.44	269.50	287.95
Nuts per ton - nuts	7,165	6,540	6,616	6,810	7,000
Nuts per frasila - nuts	111.9	102.2	104.3	106.4	109.4

(2) Copra prices realised:—

	1950	1949	1948	1947	1946
per 100 lb. Shs.	47.08	37.57	33.40	24.06	20.53
per ton - Shs.	1,540.56	842.00	748.50	539.00	460.00

The number of nuts harvested was nearly as great as the bumper crop of last year but they were smaller in size and more were needed to make a ton of copra.

The area under cocoa was extended in the Government Plantations by planting some 2,715 seedlings during the *masika*. Much of the cocoa area is showing insect damage associated with lack of shade, and shade trees were extensively planted up in the *vuli* rains. Blocks of derris, pineapples, and timber trees were also established during the year.

6. PRODUCE INSPECTION.

A record number of bales of cloves, 227,784, was passed for export under the Agricultural Produce Export Decree this year, against 104,269 in 1949. 99½ per cent were of Grade II.

The work of this section was therefore more than twice as heavy as last year and the rush of examining and preparing cloves for shipment was so great that the unusual scenes which called for special comment in last year's report became commonplace at the end of this year. A special feature of the year's work was that by far the greatest proportion of the cloves arriving from Pemba never left the dock area but passed direct into the export godown for immediate shipment. This speedy movement of cloves from the plantation to overseas markets necessitated particular care and attention being paid to the dryness of the spice.

The figures for the examination of cloves and clove stems under the Adulteration of Produce Decree are as follows:—

Origin	Cloves in Bags		Failed for		
	Total deliveries	Passed	Excessive moisture	Extraneous matter	Percentage of failures.
Zanzibar	... 66,370	... 60,947	... 5,243	... 180	... 8
Pemba	... 323,302	... 296,574	... 26,349	... 379	... 8
Total	... 389,672	357,521	31,592	559	8

Origin	Clove Stems in Bags		Failed for		
	Total deliveries	Passed	Excessive moisture	Extraneous matter	Percentage of failures
Zanzibar	... 19,434	19,243	106	85	1
Pemba	... 96,194	91,746	4,448		5
Total	... 115,628	110,989	4,639		4

The following figures are in respect of copra examined in Zanzibar, the Pemba produce having already been inspected and screened at Pemba ports:—

Origin	Copra in Bags		Failed for		
	Total deliveries	Passed	Excessive moisture	Extraneous matter	Percentage of failures
Zanzibar	... 172,108	... 164,913	... 6,429	... 766	... 5
Pemba	... 57,279	... 57,279	...	...	...
Total	... 229,387	222,192	6,429	766	4

In Pemba three per cent of the copra presented for shipment to Zanzibar was failed.

Coconut oil is inspected and tested by the Government Chemist prior to export. No copra was exported in 1950 and the exports of oil were higher than in previous years thus :—

1946	...	1,357,641 lb
1947	...	2,344,945 lb.
1948	...	7,077,816 lb.
1949	...	14,423,998 lb.
1950	...	16,671,334 lb.

Some 718 bags of chillies representing $25\frac{3}{4}$ tons were inspected and passed for export compared with less than 16 tons last year.

No mangrove bark was exported.

7. CHEMICAL LABORATORY.

Since the end of 1949 no Government Chemist has been available, and, although a general supervision of the laboratory work has been given by Mr. A. K. Briant, no investigational work has been undertaken and the activities of the laboratory have been chiefly confined to routine analyses.

This work, however, is by no means light and continues to increase each year as is shown by the following figures of samples examined.

	1947	1948	1949	1950
Samples examined	993	1,185	1,876	2,293

Of the 2,293 samples examined this year 2,112 came from Government Departments, 110 from the Clove Growers' Association and 71 from private firms. A major part of the work is the analysis of coconut oil samples taken from export bulks. Some Shs. 692.50 was received in fees from private firms, more than three times last year's figure. Shs. 19,600.12 was also received by the Inspector of Produce in respect of coconut oil samples.

Clove bud and stem oil sampled from the Clove Growers' Association distillery maintained a satisfactory eugenol content throughout the year. Coconut oil quality was also satisfactory, and of 1,460 samples only 53 failed to comply with the required standards. Of these 29 failed for moisture, 21 for acidity and 3 for impurities.

Mr. Jabir Saleh Farsy, Laboratory Assistant, was awarded a scholarship in Chemistry tenable at the University College of Wales.

S. PRINCIPAL AGRICULTURAL LEGISLATION.

The following is a list of the principal agricultural legislation enacted during the year:—

Government Notice No.	1	The Agricultural Produce (Amendment) Decree No. 13 of 1949 was brought into force as from 1.1.50	<i>Date</i> ... 7— 1—50
„	No. 2	The Clove (Minimum Percentage of Exported Cloves) Order, 1950. Under the Cloves Decree No. 9 of 1938 revokes Government Notice No. 175 of 1948 and removes the obligation of clove exporters to purchase any cloves from the Clove Growers' Association	... 9— 1—50
„	No. 19 }	These orders made under the District Administration and Rural Local Government Decree No. 14 of 1947 make it an offence in specified parts of Zanzibar to cause fires without taking precautions that damage is not caused to crops	18— 2—50
„	No. 20 }		
„	No. 63	The Plantation Workers (Clove-picking Contracts) Regulations, 1950. Under Decree No. 11 of 1946 prescribes terms and conditions to be embodied in clove pickers contracts for the 1950-51 clove harvest	... 3— 6—51
„	No. 69	This notice made under Cap. 118 fixes the prices to be paid by the Clove Growers' Association for cloves and clove stems for the period 1.7.50 to 30.6.51	... 1— 7—50
„	No. 111	This notice declares hides and skins to be agricultural produce for purposes of the Agricultural Produce Export Decree (Cap. 116)	... 25—11—50
„	No. 112	The Agricultural Produce Export (Hides and Skins) Rules, 1950. These rules made under Cap. 116 prescribes that hides and skins dried in the Government Drying Shed only shall be branded with the letter "Z"	... 25—11—50
Decree	No. 12	The Forest Reserve Decree, 1950.	
„	No. 13	The Copra Decree, 1950. This Decree replaces the Copra Cess Decree No. 12 of 1947.	
Government Notice No.	124	This notice brings into force the Copra Decree No. 13 of 1950, as from 1.1.51	... 23—12—50

A. K. BRIANT,
Director of Agriculture.
1st November, 1951.

Appendix I

STATEMENT OF REVENUE AND EXPENDITURE OF
GOVERNMENT PLANTATIONS

REVENUE

			<i>Shs.</i>	<i>cts.</i>	<i>Shs.</i>	<i>cts.</i>
Cloves	...	...	126,470	59		
Coconuts	...	...	323,800	00		
Miscellaneous	...	...	10,259	68		
Leased Plantations	...	...	1,200	00		
Hire of Lorry	...	...	314	50		
Rent of Staff Quarters	...	...	1,090	24		
			463,135	01		
<i>Less</i> value of produce brought forward	...	...	19,017	00		
			444,118	01		
<i>Add</i> value of produce brought forward	...	...	118,851	70	562,969	71

EXPENDITURE

Personal Emoluments	...	37,319	75		
Other Charges	...	268,546	19	305,865	94
Revenue exceeds Expenditure by	...			257,103	77
			=	£12,855.3.77	

Appendix II

REVENUE AND EXPENDITURE OF GOVERNMENT PLANTATIONS

REVENUE

	<i>Kidichi</i>		<i>Selem</i>		<i>Mtoni</i>		<i>Chukwani</i>		<i>Total</i>	
	Shs.	Cts.	Shs.	Cts.	Shs.	Cts.	Shs.	Cts.	Shs.	Cts.
Cloves and stems	197,795	15	17,775	44	800	00	100	00	126,470	59
Copra	169,867	29	31,994	82	54,726	37	32,268	61	288,857	09
Coconuts	15,170	45	1,432	90	7,739	76	4,283	80	28,626	91
Coconut crops	...	...	360	00	3,745	00	2,211	00	6,316	00
Miscellaneous	3 885	95	2,817	63	2,893	10	663	00	10,259	68
Leased plantations	...	...	1,200	00	...	...	...	...	1,200	00
Hire of lorry	184	36	64	96	30	62	34	62	314	50
Rent of quarters	665	08	136	52	176	14	112	50	1,090	24
	297,568	22	55,782	27	70,110	99	39,673	53	463,135	01
<i>Less</i> value of produce brought forward	12,212	40	...	...	2,679	00	4,125	60	19,017	00
	285,355	82	55,782	27	67,431	99	35,547	93	444,118	01
<i>Add</i> value of produce brought forward	78,541	11	10,731	05	19,743	57	9,835	97	118,851	70
Total Revenue	363,896	93	66 513	32	87,175	56	45,383	90	562,969	71

EXPENDITURE

	<i>Kidichi</i>		<i>Selem</i>		<i>Mtoni</i>		<i>Chukwani</i>		<i>Total</i>	
	Shs.	Cts.	Shs.	Cts.	Shs.	Cts.	Shs.	Cts.	Shs.	Cts.
Personal emoluments	8,867	50	1,820	00	2,400	00	1,500	00	14,587	50
Transport expenses	2,576	49	1,265	82	524	24	672	02	5,038	57
Materials and tools	1,242	56	615	56	272	25	103	30	2,233	67
Labour	131,298	58	44,877	74	37,507	16	32,952	29	246,635	75
Repairs to buildings	2,188	30	5,196	03	1,502	40	966	18	9,852	91
Lorry transport and maintenance	2,807	00	989	29	464	00	525	00	4,785	29
Total Expenditure	148,980	41	54,764	44	42,670	05	36,718	79	283,133	69
Profit	214,916	52	11,748	88	44,505	51	8,665	11	279,826	02
							=		£13,991-16-02	

Appendix III

DISTRIBUTION OF PLANTING MATERIAL

Avocado pear	...	Nos.	31
Banana suckers	...	"	215
Breadfruit	...	"	180
Cocoa seedlings	...	"	8,444
Cassava cuttings	...	"	307,346
Candlenut	...	"	57
Carambola seedlings	...	"	32
Chillie seedlings	...	"	55,000
Cluster bean seeds	...	lb.	3
Cowpea seeds	...	"	492
<i>Coffea liberica</i> seedlings	...	Nos.	1,102
Derris cuttings	...	"	14,940
<i>Digitaria</i> spp. (Jangombe)	...	pakachas	40
Durian seedlings	...	Nos.	24
Elephant grass	...	pakachas	4
<i>Eugenia aquea</i> cuttings	...	Nos.	9
<i>Eugenia javanica</i>	...	"	27
<i>Eugenia malaccensis</i>	...	"	7
<i>Eugenia uniflora</i> seedlings	...	"	19
Figs	...	"	44
Gram	...	"	28
Grapefruit, budded	...	"	100
Groundnuts	...	lb.	114
Guava	...	Nos.	5
Jack fruit seedlings	...	"	654
Kudzu seeds	...	lb.	74
Lime seedlings	...	Nos.	68
Litchi	...	"	40
Mandarin	...	"	142
Maize seed	...	lb.	1,462
Madras thorn seed	...	"	33
Mango (Muyuni) seedlings	...	Nos.	68

DISTRIBUTION OF PLANTING MATERIAL — (Contd.)

Mango (Julie) grafted	...	Nos.	15
Mucuna seed	...	lb.	2
Nutmeg seedlings	...	Nos.	14
Oranges budded	...	"	2,400
Pemba grass	...	pakachas	4
Pemba grass seed	...	lb.	5
Pomelo	...	Nos.	221
Pigeon Pea seed	...	lb.	242
Pomegranate seedlings	...	Nos.	45
<i>Piper nigrum</i> seedlings	...	"	45
Pineapple suckers	...	"	10,332
Rice seed	...	lb.	2,579
Rice seedlings	...	Nos.	242,200
Rose apple seedlings	...	"	30
Rambutan seedlings	...	"	125
Sapodilla seedlings	...	"	13
Smooth lemon budded	...	"	2
Sorghum seed	...	lb.	505
Sweet potato vines	...	Nos.	84,025
Sweet potatoes	...	lb.	788
Sunflower (white) seed	...	"	290
Soursop seedlings	...	Nos.	37
Sweet limes	...	"	8
Tamarind seedlings	...	"	87
Yams	...	lb.	40

Appendix IV

DOMESTIC EXPORTS, 1950

<i>Items</i>	<i>Unit of Quantity</i>	<i>Quantity</i>	<i>Value</i>	<i>Percentage of Total value</i>
Cloves	Cental of 100 lb.	396,435	£ 3,199,945	73.86
Clove bud and stem oil	lb.	343,565	113,621	2.62
Copra	ton.	...	...	...
Coconuts	cwt.	2,182	907	0.01
Oil cake	cwt.	106,179	117,757	2.71
Soap, common and toilet	cwt.	11,925	39,711	0.91
Coconut oil	cwt.	160,179	786,086	18.12
Mangrove bark	ton.	...	...	...
Chillies	cwt.	513	6,821	0.15
Fruit, fresh	cwt.	18,729	6,559	0.15
Bêche-de-mer	cwt.	260	820	0.01
Tobacco, unmanufactured	lb.	13,118	384	...
Ox hides	cwt.	885	5,933	0.13
Skins, sheep and goat	cwt.	186	4,407	0.11
Livestock	No.	85	86	...
Forest products	value	...	2,347	0.05
Kapok	cwt.	832	9,657	0.22
Fibres, manufactured	ton.	2	37	...
Shells, marine	cwt.	5,304	13,304	0.30
Fish, dried or salted	cwt.	160	1,362	0.03
Fish, fresh	cwt.	153	374	...
Lime	cwt.	49,437	5,110	0.11
Other articles			22,264	0.51
			4,337,492	100.00

Appendix V

APPROXIMATE PRODUCTION OF CLOVES IN FRASILAS OF
35 lb. FOR 35 CROP YEARS

(1st July to 30th June)

(Based on receipts of cloves at the Central Market and C.G.A.)

<i>Season</i>	<i>Zanzibar Frasilas</i>	<i>Pemba Frasilas</i>	<i>Total Frasilas</i>	<i>Mean crop per season in 5 year periods Frasilas</i>
1915/16	141,641	655,116	796,757	...
1916/17	208,716	302,919	511,635	...
1917/18	63,958	234,239	298,197	...
1918/19	259,273	565,229	824,502	...
1919/20	93,847	168,703	262,550	538,728
1920/21	231,831	316,446	548,277	489,032
1921/22	65,819	200,983	266,802	440,065
1922/23	291,417	690,498	981,915	576,809
1923/24	75,027	236,767	311,794	474,267
1924/25	240,952	520,490	761,442	574,046
1925/26	219,192	392,622	611,814	586,753
1926/27	203,843	529,186	733,029	679,998
1927/28	190,370	500,382	690,752	621,766
1928/29	74,828	125,740	200,568	599,521
1929/30	318,647	610,296	928,943	633,021
1930/31	51,796	201,320	253,116	561,281
1931/32	175,070	760,786	935,856	601,847
1932/33	242,772	244,594	487,366	561,169
1933/34	146,098	781,090	927,188	706,493
1934/35	360,037	503,415	863,452	693,395
1935/36	65,938	232,571	298,509	702,474
1936/37	45,096	351,568	396,664	592,635
1937/38	446,500	909,416	1,355,916	768,345
1938/39	39,879	115,211	155,090	613,926
1939/40	168,041	501,474	669,515	575,139
1940/41	146,323	575,277	721,600	659,757
1941/42	297,578	889,550	1,187,128	817,849
1942/43	40,049	223,691	263,740	599,414
1943/44	263,423	777,218	1,040,641	776,524
1944/45	200,417	459,396	659,813	774,584
1945/46	26,493	161,075	187,568	647,778
1946/47	170,280	924,329	1,094,609	649,074
1947/48	30,914	280,986	311,900	658,906
1948/49	81,700	310,971	392,671	529,312
1949/50	153,888	430,253	584,141	514,177
Average for 35 seasons	166,618	448,109	614,727	

Appendix VI

MONTHLY AND ANNUAL RAINFALL TOTALS FOR THE YEAR 1950 FOR STATIONS IN ZANZIBAR AND PEMBA

	Jan.	Feb.	March	April	May	June	July	August	Sept.	October	Nov.	Dec.	Total 1950	Total 1949
Clove Growing Areas :														
Kizimbani Rain ...	0.97	0.87	11.95	17.87	10.73	1.20	2.32	0.90	5.11	2.90	7.50	7.48	69.80	54.56
Wet Days ...	5	7	24	28	16	6	12	12	17	16	16	22	181	149
Mkwajuni Rain ...	0.33	0.14	16.05	15.72	10.40	1.86	2.94	1.79	3.86	0.76	3.49	3.13	60.47	36.03
Wet Days ...	2	2	21	25	19	6	19	13	14	4	9	11	145	126
Selem Rain ...	1.27	0.96	9.46	15.86	10.91	1.83	1.58	0.88	2.70	2.54	6.39	6.08	60.46	38.26
Wet Days ...	6	6	20	25	16	5	18	14	15	13	17	14	169	141
Mkokotoni Rain ...	...	0.37	9.86	18.46	9.34	2.41	3.58	2.56	3.69	1.02	3.67	1.28	56.24	41.80
Wet Days ...	...	4	19	21	18	5	18	11	11	5	12	6	130	111
Mwera Rain ...	1.60	0.62	16.37	23.76	3.89	1.79	1.23	2.09	1.51	3.43	6.22	11.03	73.54	55.55
Wet Days ...	5	3	21	25	11	4	13	8	8	13	14	16	141	113
Kigomasha Rain ...	0.17	...	3.59	16.27	12.06	1.71	3.98	2.16	2.39	1.65	2.50	1.82	48.30	48.39
Wet Days ...	1	...	9	20	22	9	14	12	9	9	6	11	122	101
Matangatiwani Rain ...	0.08	0.11	14.02	23.60	16.98	2.01	3.48	1.50	0.66	2.19	3.66	5.68	73.97	53.47
Wet Days ...	2	2	17	27	27	11	18	14	10	9	10	17	164	139
Wete Rain ...	0.47	0.23	10.22	25.56	16.59	1.76	2.31	1.75	1.14	0.26	3.95	6.08	70.32	45.16
Wet Days ...	2	3	19	24	26	12	14	11	4	3	13	15	146	125
Mkoani Rain ...	2.69	0.10	12.79	38.26	16.04	1.24	1.05	1.91	1.93	0.44	3.34	8.75	88.57	45.90
Wet Days ...	4	3	20	26	15	7	6	10	10	4	7	13	125	120
Mtambile Rain ...	1.62	0.08	10.51	31.70	16.85	1.07	0.84	2.32	1.34	0.34	2.53	13.74	82.94	71.53
Wet Days ...	6	4	23	22	18	9	13	14	13	3	11	10	146	141
Limbani Rain ...	0.37	0.15	9.38	22.55	20.13	2.22	3.70	1.64	0.79	0.59	4.25	7.43	73.20	46.97
Wet Days ...	4	2	18	26	23	13	16	9	4	3	11	15	144	158
Wesha Rain ...	0.36	...	9.22	34.04	15.62	2.32	2.25	1.11	0.75	0.26	2.79	3.67	72.39	43.55
Wet Days ...	4	...	18	25	25	10	11	6	5	2	9	16	131	127
Non-Clove Growing Areas :														
Chukwani Rain ...	1.06	1.61	8.11	10.10	7.10	0.41	1.11	1.72	1.67	0.99	4.31	5.36	43.55	31.96
Wet Days ...	8	9	19	23	14	2	10	9	14	6	15	16	145	126
Victoria Gardens Rain ...	0.38	2.11	14.36	15.04	7.61	0.47	1.50	2.92	3.58	3.99	5.65	5.38	62.99	36.54
Wet Days ...	6	6	20	24	15	4	10	12	13	12	14	13	149	111
Chwaka Rain ...	0.15	0.17	4.53	18.48	9.78	2.80	1.50	1.52	0.50	0.24	2.27	1.74	43.78	38.14
Wet Days ...	1	3	16	24	13	6	7	8	3	2	7	14	104	77
Hanyegwa Mbana Rain ...	1.21	0.65	7.86	23.51	11.30	1.16	2.41	1.26	1.30	0.93	1.32	3.22	56.13	45.36
Wet Days ...	3	4	19	21	16	5	10	18	7	3	5	7	111	89
Muongoni Rain ...	0.74	1.24	7.87	15.95	8.46	1.29	1.25	0.95	1.06	0.92	1.85	3.52	45.10	29.42
Wet Days ...	3	3	21	20	18	5	8	7	7	5	8	9	114	79
Makunduchi Rain ...	0.13	2.44	10.45	18.01	11.34	1.64	1.39	0.44	1.38	0.41	1.26	2.73	51.62	28.28
Wet Days ...	3	7	18	21	18	4	5	5	7	2	4	11	105	...

